

Perchlorate: Introduction

- ❑ Perchlorate salts have been used as oxidizers in propellants for rockets, missiles, and fireworks.
- ❑ Highly soluble and mobile in water
- ❑ Little biodegradation in the environment
- ❑ Found in ground water of 20+ states and in drinking water sources of California.

Perchlorate Acts by Inhibiting Iodide Uptake

- ❑ Iodide is actively taken up into the thyroid as well as in the mammary gland, placenta, stomach, and salivary gland.
- ❑ Perchlorate competitively inhibits thyroidal iodide uptake, and can cause:
 - Serum T_3 and T_4 ↓
 - Serum TSH ↑
 - Depletion of stored colloid in thyroid, thyroid enlargement

Perchlorate

Study	Study Type	Species/ Number	Dosage/ Duration	Effects Reported
Argus Research Laboratories, 2001	Hormone, thyroid and neurohistological developmental study	Rat n not reported	0, 0.01, 0.1, 1.0, 30 mg/kg-d Two weeks prior to cohabitation through gestation day 21 (sacrifice)	Effects on brain morphometry (striatum, cerebellum, corpus callosum) in pups assessed on postnatal days 9 and 21. Effects seen at lowest dose administered. Increased absolute thyroid weights in pups at the highest dose.

Perchlorate

Study	Study Type	Species/ Number	Dosage/ Duration	Effects Reported
Argus Research Laboratories, 2000	Developmental toxicity study	Rat n=17-20 pregnant/ group	0, 0.01, 0.1, 1.0, 30 mg/kg-d ammonium perchlorate 15 days prior to cohabitation through gestation day 21 (sacrifice)	Increased preimplantation loss at all dose levels, statistically significant at the highest dose. Significant decrease in number of live fetuses and number of ossification sites per litter at the highest dose.

Perchlorate

Study	Study Type	Species/ Number	Dosage/ Duration	Effects Reported
Argus Research Laboratories, 1999	Two-generation reproduction study	Rat n=30/sex/ group	0, 0.3, 3, 30 mg/kg-d	Increased thyroid colloid depletion, hypertrophy and hyperplasia in F1 and F2 weanlings exposed to 3 and 30 mg/kg-d.

Perchlorate

Study	Study Type	Species/ Number	Dosage/ Duration	Effects Reported
Argus Research Laboratories, 1998	Neurobehavioral developmental study	Rat n=25/ group	0, 0.1, 1.0, 3.0, 10 mg/kg-d Gestation day 0 to postnatal day 22	<p>Brain morphometric changes in the 10 mg/kg-d pups and possibly in the 3 mg/kg-d pups (assessed on postnatal day 11).</p> <p>Thyroid colloid depletion, hypertrophy and hyperplasia in the 0.1 and 3 mg/kg-d pups.</p> <p>Thyroid hormone (T3 and T4) changes in the 0.1 and 1 mg/kg-d pups.</p> <p>Increased motor activity.</p>

Perchlorate

Study	Study Type	Species/ Number	Dosage/ Duration	Effects Reported
Postel, 1957	Transplacental transport and goiter study	Guinea pig n=16 (control n=3)	1% potassium perchlorate in drinking water gestation days 21-48	Enlarged thyroids in treated fetuses; no effect on maternal thyroid size.

Perchlorate: Animal Data Pertaining to DART Evaluation

- ❑ Developmental studies in rats reportedly resulting in:
 - ❑ Decreased thyroid weights in pups
 - ❑ Changes in brain morphometry of young pups
 - ❑ Increased motor activity
 - ❑ Increased preimplantation loss.
 - ❑ Decrease in number of live fetuses and number of ossification sites per litter.
- ❑ Two-generation reproductive study in rats reportedly resulting in:
 - ❑ Thyroid effects in F1 and F2 weanlings.